

WE CLAIM:

1. A method for fabricating a laminate composite structure comprising:  
  
layering a plurality of plies of material with interspersed orientations within a stacking sequence to create a solid laminate; and  
  
5 inserting a plurality of pins into the solid laminate composite, prior to curing the laminate composite, at locations in the geometry of the solid laminate where the solid laminate forms a bend.
2. The method of claim 1 wherein the plurality of pins are composite material inserted substantially normal to the laminate composite surface.
- 10 3. The method of claim 1, wherein the location of the plurality of pins extends beyond the bend in the solid laminate.
4. The method of claim 3, wherein the plurality of pins are inserted into the solid laminate with decreasing density as the location of the plurality of pins extends outward from the bend.
- 15 5. The method of claim 1, wherein the laminate composite structure is comprised of a solid laminate and a composite sandwich structure, the method further comprising:  
  
terminating a plurality of the inner plies of the solid laminate such that the outer plies of the laminate composite extend to create a top face sheet and a bottom face sheet  
20 of the composite sandwich structure;  
  
inserting a second plurality of plies of material in the laminate composite where the inner plies of the solid laminate terminate and extending the second plurality of plies

of material from the point of termination of the inner plies for a specified distance, wherein the second plurality of plies of material do not extend as long as the top face sheet and the bottom face sheet of the composite sandwich structure; and

5 inserting core material into a void in the laminate composite bounded by the termination of the second plurality of plies of material, the top face sheet, and the bottom face sheet.

6. The method of claim 5 wherein the plurality of inner plies of the solid laminate are terminated sequentially, beginning with the innermost ply first and continuing outward toward the top and bottom face sheets, and wherein each ply of the  
10 second plurality of plies of material begins where an inner ply of the solid laminate terminates and each ply of the second plurality of plies of material terminates in the same location, creating a wedge of material plies inserted into the laminate composite.

7. The method of claim 5 wherein the second plurality of plies of material are all oriented at substantially 90 degrees.

15 8. A method for fabricating a laminate composite structure integrally comprising a solid laminate composite and composite sandwich structure, the method comprising:

layering a plurality of plies of material at interspersed orientations within a stacking sequence to create a solid laminate;

20 terminating a plurality of the inner plies of the solid laminate such that the outer plies of the laminate composite extend to create a top face sheet and a bottom face sheet of the composite sandwich structure;

inserting a second plurality of plies of material in the laminate composite where the inner plies of the solid laminate terminate and extending the second plurality of plies

of material from the point of termination of the inner plies for a specified distance, wherein the second plurality of plies of material do not extend as long as the top face sheet and the bottom face sheet of the composite sandwich structure; and

5 inserting core material into a void in the laminate composite bounded by the termination of the second plurality of plies of material, the top face sheet, and the bottom face sheet.

9. The method of claim 8 wherein the solid laminate is comprised of approximately 61 plies of material and the second plurality of plies of material is comprised of approximately 21 plies of material.

10 10. The method of claim 9 wherein the bend in the solid laminate is approximately 45 degrees and the second plurality of plies of material begins approximately 0.61 inches from the bend in the solid laminate and terminates approximately 2.25 inches from the bend in the solid laminate.

11. The method of claim 8 wherein the second plurality of plies of material  
15 are all oriented at substantially 90 degrees.

12. The method of claim 8 wherein the plurality of inner plies of the solid laminate are terminated sequentially, beginning with the innermost ply first and continuing outward toward the top and bottom face sheets, and wherein each ply of the second plurality of plies of material begins where an inner ply of the solid laminate  
20 terminates and each ply of the second plurality of plies of material terminates in the same location, creating a wedge of material plies inserted into the laminate composite.

13. The method of claim 12, wherein the wedge of material plies are inserted into the laminate composite in such a way that total number of plies in the laminate composite remains the same from the solid laminate up to the core material.

14. The method of claim 8 further comprising inserting a plurality of pins into the solid laminate composite, prior to curing the laminate composite, at locations in the geometry of the solid laminate where the solid laminate forms a bend.

15. The method of claim 14 whereas the plurality of pins are composite  
5 material inserted substantially normal to the laminate composite surface.

16. A laminate composite structure comprising:

a solid laminate composite;

a composite sandwich structure, integrally connected to the solid laminate  
composite;

10 said solid laminate composite comprising a plurality of plies of material layered at interspersed orientations within a stacking sequence;

said composite sandwich structure comprising a top face sheet and a bottom face  
sheet with a core material disposed between, wherein the top face sheet and the bottom  
face sheet of the sandwich structure are adjacent to a first side and a third side of the core  
15 material and comprised of extended outer plies of the plurality of plies of material; and

a plurality of pins in the solid laminate composite, at locations in the geometry of  
the solid laminate where the solid laminate forms a bend.

17. The laminate composite structure of claim 16 further comprising a second  
plurality of plies of material disposed in the laminate composite where the inner plies of  
20 the solid laminate terminate, wherein a first end of the second plurality of plies of  
material extend from the point of termination of the inner plies for a specified distance  
that does not exceed the extension of the top face sheet and the bottom face sheet of the

composite sandwich structure, said core material having a second side adjacent a second end of the second plurality of plies of material.

18. The laminate composite structure of claim 17 wherein the second plurality of plies of material are all oriented at substantially 90 degrees.

5 19. The laminate composite structure of claim 17 wherein the plurality of inner plies of the solid laminate terminate sequentially, beginning with the innermost ply first and continuing outward toward the top and bottom face sheets, and wherein each ply of the second plurality of plies of material begins where an inner ply of the solid laminate terminates and each ply of the second plurality of plies of material terminates in the same  
10 location, creating a wedge of material plies inserted into the laminate composite such that the total number of plies in the laminate composite remains the same from the solid laminate up to the core material.

20. The laminate composite structure of claim 16 wherein the plurality of pins are composite material oriented substantially normal to the laminate composite surface.

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